

**UNIVERSIDAD POLITÉCNICA DE MADRID**

ESCUELA TÉCNICA SUPERIOR DE INGENIERÍA DE MONTES,  
FORESTAL Y DEL MEDIO NATURAL



**GRADO EN INGENIERÍA DEL MEDIO NATURAL**

PROYECTO DE FIN DE GRADO

**CARTOGRAFÍA DE FORMACIONES ARBÓREAS  
BASADAS EN EL MAPA FORESTAL MEDIANTE EL USO  
DE SERIES DE TIEMPO SENTINEL-2. APLICACIÓN A  
UNA ZONA DE LA SIERRA DE GUADARRAMA**

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**Title:** Mapping of tree covers based on the Spanish Forest Map using Sentinel-2 time series. Application to an area in the Guadarrama Mountains.

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## **Abstract:**

Remote sensing is a fundamental tool for the monitoring and study of tree covers due to its high spatial and temporal resolution, which allow continuous and detailed analysis of the Earth's surface. In this project, this information from the Sentinel-2 satellites was used to characterize different tree formations present in an area in the Guadarrama Mountains by using the NDVI index and the autocorrelation function. Data with a spatial frequency of 10 m and a time of 5 days were used for the period from January 2016 to March 2020. With this data, three different tree cover classification models were developed using the Random Forest classification algorithm and using as base data the information from the Spanish Forest Map at 1:50,000 scale. The first model was based only on NDVI values, the second on autocorrelation coefficients only and, finally, the third on which the two parameters were combined. This last model obtained the best results with an overall accuracy of 67% and a kappa coefficient of 0.62. This model was applied to the entire study area and compared with forest maps 1:50,000 and 1:25,000, observing how the current cartography resembles that created from the model. In view of the results obtained, the possibility of implementing this type of models for the development of cartography and the optimization of the methodology by which the Forest Map is currently mapped is considered. In terms of improvement, the use of other parameters to characterize tree formations and use a greater amount of sampling data to train the model should be studied.